HTIRC02-011

1. A process to manufacture a CPP GMR read head, comprising:

depositing, in succession on a lower lead layer, a seed layer and a pinning layer;

on said pinning layer, depositing a first layer of CoFe to a thickness between 50 and 90 Angstroms;

depositing a layer of rhodium, to a thickness between about 5 and 7 Angstroms, on said first layer of CoFe;

on said rhodium layer, depositing a second layer of CoFe to a thickness between 50 and 90 Angstroms;

on said second layer of CoFe, depositing a copper spacer layer;

on said copper spacer layer, depositing a free layer to a thickness between 20 and 60 Angstroms;

through annealing in a magnetic field between 10 and 15 kOe, for between 300 and 600 minutes at a temperature between 200 and 250°C, causing said first CoFe layer and said pinning layer to become magnetically coupled to one another; and

on said free layer, depositing an upper lead layer, thereby forming said CPP GMR read head.

2. The process described in claim 1 wherein said pinning layer is MnPt deposited to a thickness between 80 and 200 Angstroms.

3. The process described in claim 1 wherein said CPP GMR read head has a total

thickness that is less than 400 Angstroms.

4. The process described in claim 1 wherein said CPP GMR read head has a GMR ratio greater than 2.5%.

5. The process described in claim 1 wherein said free layer is CoFe, NiFe, or CoFeNi.

6. A process to manufacture a CPP GMR read head, comprising:

depositing a free layer, to a thickness between 20 and 50 Angstroms, on a lower lead layer;

depositing a copper spacer layer on said free layer;

on said copper spacer layer, depositing a first layer of CoFe to a thickness between 50 and 90 Angstroms;

depositing a layer of rhodium, to a thickness between about 5 and 7 Angstroms, on said first layer of CoFe;

on said rhodium layer, depositing a second layer of CoFe to a thickness between 50 and 90 Angstroms;

depositing a pinning layer on said second layer of CoFe;

through annealing in a magnetic field between 10 and 15 kOe, for between 300 and 600 minutes at a temperature between 250 and 300 °C, causing said second layer of CoFe to become magnetically coupled to said pinning layer; and

on said pinning layer, depositing an upper lead layer, thereby forming said CPP GMR read head.

7. The process described in claim 6 wherein said pinning layer is MnPt deposited to a thickness between 80 and 200 Angstroms.

8. The process described in claim 6 wherein said CPP GMR read head has a total thickness that is less than 400 Angstroms.

9. The process described in claim 6 wherein said CPP GMR read head has a GMR ratio greater than 2.5 %.

10. The process described in claim 6 wherein said free layer is CoFe, NiFe, or CoNiFe.

11. A process to manufacture a magnetic tunneling read head, comprising:

depositing, in succession on a lower lead layer, a seed layer and a pinning layer;

on said pinning layer, depositing a first layer of CoFe to a thickness between 50 and 90 Angstroms;

depositing a layer of rhodium, to a thickness between about 5 and 7 Angstroms, on said first layer of CoFe;

on said rhodium layer, depositing a second layer of CoFe to a thickness between

50 and 90 Angstroms;

on said second layer of CoFe, depositing an insulated tunneling layer;

on said insulated tunneling layer, depositing a free layer to a thickness between 20 and 50 Angstroms;

through annealing in a magnetic field between 10 and 15 kOe, for between 300 and 600 minutes at a temperature between 250 and 280 °C, causing said first CoFe layer to be magnetically coupled to said pinning layer; and

on said free layer, depositing an upper lead layer, thereby forming said magnetic tunneling read head.

12. The process described in claim 11 wherein said pinning layer is MnPt deposited to a thickness between 80 and 200 Angstroms.

13. The process described in claim 11 wherein said magnetic tunneling read head has a total thickness that is less than 400 Angstroms.

14. The process described in claim 11 wherein said magnetic tunneling read head has a GMR ratio greater than 20 %.

15. The process described in claim 11 wherein said free layer is CoFe.

16. A process to manufacture a magnetic tunneling read head, comprising:

depositing a free layer, to a thickness between 20 and 50 Angstroms, on a lower lead layer;

depositing an insulated tunneling layer on said free layer;

on said insulated tunneling layer, depositing a first layer of CoFe to a thickness between 50 and 90 Angstroms;

depositing a layer of rhodium, to a thickness between about 5 and 7 Angstroms, on said first layer of CoFe;

on said rhodium layer, depositing a second layer of CoFe to a thickness between 50 and 90 Angstroms;

depositing a pinning layer on said second layer of CoFe;

through annealing in a magnetic field between 10 and 15 kOe, for between 300 and 600 minutes at a temperature between 250 and 280 °C, causing said second CoFe layer to be magnetically coupled to said pinning layer; and

on said pinning layer, depositing an upper lead layer, thereby forming said magnetic tunneling read head.

17. The process described in claim 16 wherein said pinning layer is MnPt deposited to a thickness between 80 and 200 Angstroms.

18. The process described in claim 16 wherein said magnetic tunneling read head has

a total thickness that is less than 400 Angstroms.

19. The process described in claim 16 wherein said magnetic tunneling read head has a GMR ratio greater than 20%.

20. The process described in claim 16 wherein said free layer is CoFe, NiFe, or NiFeCo.

21 . A CPP GMR read head, comprising:

a seed layer on a lower lead layer;

a pinning layer on said seed layer;

on said pinning layer, a first layer of CoFe having a thickness between 50 and 90 Angstroms;

on said first layer of CoFe, a layer of rhodium between about 5 and 7 Angstroms thick;

on said rhodium layer, a second layer of CoFe having a thickness between 50 and 90 Angstroms;

said first and second layers of CoFe being magnetically anti-parallel to one another;

on said second layer of CoFe, a copper spacer layer;

on said copper spacer layer, a free layer having a thickness between 20 and 50 Angstroms; and

an upper lead layer on said free layer.

22. The CPP GMR read head described in claim 21 wherein said pinning layer is MnPt having a thickness between 80 and 200 Angstroms.

23. The CPP GMR read head described in claim 21 wherein said CPP GMR read head has a total thickness that is less than 400 Angstroms.

24. The CPP GMR read head described in claim 21 wherein said read head has a GMR ratio greater than 2.5 %.

25. The CPP GMR read head described in claim 21 wherein said free layer is CoFe, NiFe, or CoNiFe.

26. A CPP GMR read head, comprising:

a free layer, having a thickness between 20 and 50 Angstroms, on a lower lead layer;

a copper spacer layer on said free layer;

on said copper spacer layer, a first layer of CoFe having a thickness between 50 and 90 Angstroms;

a layer of rhodium having a thickness between about 5 and 7 Angstroms, on said

first layer of CoFe;

on said rhodium layer, a second layer of CoFe having thickness between 50 and 90 Angstroms;

said first and second layers of CoFe being magnetically anti-parallel to one another;

on said second layer of CoFe, a copper spacer layer;

on said copper spacer layer, a free layer having a thickness between 20 and 50 Angstroms; and

an upper lead layer on said free layer.

27. The CPP GMR read head described in claim 26 wherein said pinning layer is MnPt having a thickness between 80 and 200 Angstroms.

28. The CPP GMR read head described in claim 26 wherein said CPP GMR read head has a total thickness that is less than 400 Angstroms.

29. The CPP GMR read head described in claim 26 wherein said read head has a GMR ratio greater than 2.5%.

30. The CPP GMR read head described in claim 26 wherein said free layer is CoFe, NiFe, or NiFeCo.

31. A magnetic tunneling read head, comprising:

a seed layer on a lower lead layer;

a pinning layer on said seed layer;

on said pinning layer, a first layer of CoFe having a thickness between 50 and 90 Angstroms;

a layer of rhodium, having a thickness between about 5 and 7 Angstroms, on said first layer of CoFe;

on said rhodium layer, a second layer of CoFe having a thickness between 50 and 90 Angstroms;

said first and second layers of CoFe being magnetically anti-parallel to one another;

on said second layer of CoFe, an insulated tunneling layer;

on said insulated tunneling layer, a free layer having and a thickness between 20 and 50 Angstroms; and

an upper lead layer on said free layer.

32. The magnetic tunneling read head described in claim 31 wherein said pinning layer is MnPt having a thickness between 80 and 200 Angstroms.

33. The magnetic tunneling read head described in claim 32 wherein said magnetic tunneling read head has a total thickness that is less than 400 Angstroms.

34. The magnetic tunneling read head described in claim 26 wherein said read head has a GMR ratio greater than 20%.

35. The magnetic tunneling read head described in claim 26 wherein said free layer is CoFe, NiFe, or NiFeCo.

36. A magnetic tunneling read head, comprising:

a free layer, having a thickness between 20 and 50 Angstroms, on a lower lead layer;

an insulated tunneling layer on said free layer;

on said insulated tunneling layer, a first layer of CoFe having a thickness between 50 and 70 Angstroms;

a layer of rhodium, having a thickness between about 5 and 7 Angstroms, on said first layer of CoFe;

on said rhodium layer, a second layer of CoFe having a thickness between 50 and 90 Angstroms;

said first and second layers of CoFe being magnetically anti-parallel to one another;

a pinning layer on said second layer of CoFe; and

an upper lead layer on said pinning layer.

37. The magnetic tunneling read head described in claim 36 wherein said pinning layer

is MnPt having a thickness between 80 and 200 Angstroms.

38. The magnetic tunneling read head described in claim 36 wherein said magnetic tunneling read head has a total thickness that is less than 400 Angstroms.

39. The magnetic tunneling read head described in claim 36 wherein said read head has a GMR ratio greater than 20%.

40. The CPP GMR read head described in claim 36 wherein said free layer is CoFe, NiFe, or NiFeCo.